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ON THE MINERALOGY OF THE COUNTIES OF DUBLIN
AND WICKLOW.

BY

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Professor of Geology in the University of Dublin.

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The most convenient method of describing the minerals that occur in these counties, is to state in succession the minerals that are found in each of the several rock formations, referred to by the Rev. Maxwell Close, in his sketch of the Geology of the neighbourhood of Dublin.

1. THE MINERALS OF THE DUBLIN AND WICKLOW GRANITES.

These minerals are twofold.

(A) *The Constituent Minerals.*

(B) *The Accidental Minerals.*

(A) *The Constituent Minerals.* The granites of Dublin and Wicklow are quinary, consisting of the following minerals:—

1. Quartz.
2. Orthoclase Feldspar.
3. Albite Feldspar.
4. Margarodite Mica.
5. Lepidomelane Mica.

1. The Constituent *Quartz* is grey, watery, transparent, and has a mean specific gravity = 2.645.

2. The Constituent *Orthoclase Feldspar* is milk white, opaque; and has a mean specific gravity = 2.540.

Its mean chemical composition, taken from seven specimens, of which three were from Dublin localities, and four from Wicklow localities, is as follows:—

Orthoclase (mean of seven Specimens.)

Silica,	.	.	.	64.59	per cent.
Alumina,	.	.	.	18.31	„
Lime,	.	.	.	0.25	„
Magnesia,	.	.	.	0.58	„
Potash,	.	.	.	12.23	„
Soda,	.	.	.	2.75	„
Loss by ignition,	.	.	.	0.58	„

99.29

3 The Constituent *Albite Feldspar* has, hitherto, been found in separate crystals, in one locality only (Dalkey); but it enters largely into the composition of the granite rocks.

Its chemical composition is as follows:—

Albite (Dalkey Quarry.)

Silica,	.	.	.	64.70	per cent.
Alumina,	.	.	.	21.80	„
Potash,	.	.	.	2.84	„
Soda,	.	.	.	9.78	„
Fluorspar*	.	.	.	0.80	„
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				99.92	

4. The Constituent *White Mica* (Margarodite) of the granites, often occurs in flat rhombic prisms, or in hexagonal plates, formed from the former by the replacement of the acute angles; the angles of the lozenges are 120° and 60°; and the crystals are Biaxial, the plane of the optic axes tracing the major diameter of the lozenge.

The following measurements of the angle between the optic axes have been recorded:—

1. Three Rock Mountain,	.	.	53° 8'
2. Glendalough,	.	.	70 4
3. Mount Leinster,	.	.	72 18
4. Lough Dan,	.	.	70 0
5. Glenmalure,	.	.	67 11
6. Poulmounty,	.	.	76 15

The average chemical composition of the white mica is as follows:—

Margarodite (Mean of four specimens.)

Silica,	.	.	.	44.58	per cent.
Alumina,	.	.	.	32.13	„
Iron peroxide,	.	.	.	4.57	„
Lime,	.	.	.	0.78	„
Magnesia,	.	.	.	0.76	„
Potash,	.	.	.	10.67	„
Soda,	.	.	.	0.95	„
Loss by ignition,	.	.	.	5.34	„
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				99.78	

The amount of water of crystallisation present in this mineral

* The Albite was found in small crystals, lining cavities in the granite, and encrusting crystals of Orthoclase; and it was associated with similar small crystals of accidental purple fluorspar, from which it was separated with difficulty.

separates it completely from *Muscovite*, of which it is considered by Dana to be an altered variety.

5. The Constituent *Black Mica* (*Lepidomelane*) of the granites occurs in hexagonal plates, and is Uniaxial. Near Ballyellin, (Co. Carlow) it is found associated with Margarodite in large plates; these plates are formed in about equal parts, of *Lepidomelane* and *Margarodite*, which fit into each other at angles of 120° —This fitting is purely mechanical and due to the fact that the angles of the *Margarodite* lozenges are 60° and 120° . *Lepidomelane* is essentially an iron-potash mica, and is distinct from *Biotite*, which is an iron magnesia mica. It is completely decomposed by hydrochloric acid. It has the following chemical composition:—

Black Mica (Lepidomelane.)

Silica,	.	.	.	35.55	per cent.
Alumina,	.	.	.	17.08	„
Iron peroxide,	.	.	.	23.70	„
Lime,	.	.	.	0.61	„
Magnesia,	.	.	.	3.07	„
Potash,	.	.	.	9.45	„
Soda,	.	.	.	0.35	„
Iron protoxide,	.	.	.	3.55	„
Manganese protoxide,	.	.	.	1.95	„
Loss by ignition,	.	.	.	4.30	„
				99.61	

The granite axis of Leinster runs from Rockabill to Poulmounty, N.N.E. to S.S.W., a distance of 90 miles.

Eleven specimens taken at about equal intervals along this axis gave the following mean chemical composition:—

Average Leinster Granite.

Silica,	.	.	.	72.07	per cent.
Alumina,	.	.	.	14.81	„
Iron peroxide,	.	.	.	2.25	„
Lime,	.	.	.	1.63	„
Magnesia,	.	.	.	0.33	„
Potash,	.	.	.	5.11	„
Soda,	.	.	.	2.79	„
Loss by Ignition,	.	.	.	1.09	„
				100.08	

From this table, combined with the preceding tables, we obtain

the following simultaneous equations, to determine the per-cent-ages of the constituent minerals in the average granite :—

Let	Q	=	the per-centage of	Quartz.
	O	„	„	Orthoclase.
	A	„	„	Albite.
	W	„	„	White Mica.
	B	„	„	Black Mica.

(1) Silica,	7207	=	100 Q + 64·95 O + 64·70 A + 44·58 W + 35·55 B.
(2) Alumina,	1481	=	— 18·31 O + 21·80 A + 32·13 W + 17·08 B.
(3) Iron peroxide,	225	=	— — — 4·57 W + 23·7 B.
(4) Lime,	163	=	— 0·25 O — — 0·78 W + 0·61 B.
(5) Magnesia,	33	=	— 0·58 O — — 0·76 W + 3·07 B.
(6) Potash,	511	=	— 12·23 O + 2·84 A + 10·67 W + 9·45 B.
(7) Soda,	279	=	— 2·75 O + 9·87 A + 0·95 W + 0·35 B.
(8) Loss by ignition,	109	=	— — — 5·34 W + 4·30 B.

If we select the four equations containing the largest per-cent-ages, viz—The alumina, potash, soda, and iron peroxide equations, we find after several reductions—

$$\begin{aligned} A &= 18\cdot0 + 0\cdot156 W + 0\cdot191 B. \\ O &= 37\cdot65 - 0\cdot909 W - 0\cdot819 B. \end{aligned}$$

These equations show the manner in which the two feldspars are related to the two micas.

We find finally—

$$\begin{aligned} B &= 5\cdot81 \text{ per cent.} \\ W &= 19\cdot16 \text{ „} \\ O &= 15\cdot44 \text{ „} \\ A &= 22\cdot10 \text{ „} \end{aligned}$$

Inserting these values into the last seven equations, we obtain—

—	Observed.	Calculated.	Diff.
Alumina,	1481	1476·06	+4·94
Iron peroxide,	225	224·99	+0·01
Lime,	163	22·28	+140·72
Magnesia,	33	41·27	—8·27
Potash,	511	511·45	—0·45
Soda,	279	280·64	—1·64
Loss by ignition,	109	126·89	—17·89

The agreement between calculation and observation is as close as could be expected ; and the errors in the magnesia and loss by ignition, are, doubtless, errors of observation, due to the small magnitudes to be ascertained. The excess in the lime is real, and must be accounted for by the existence of a small quantity of paste, in the form of a silicate of lime.

The quantity of silica required to saturate 140·72 parts of lime is about 351·8 ; from which we infer that the paste amounts to 4·92 per-cent. of the rock.

The mean composition of the Leinster Granite is, therefore, as follows :—

Quartz,	.	.	.	32·57	per cent.
Orthoclase,	.	.	.	15·44	„
Albite,	.	.	.	22·10	„
Margarodite,	.	.	.	19·16	„
Lepidomelane	.	.	.	5·81	„
Paste (silicate of lime)	.	.	.	4·92	„
				<hr/>	
				100·00	

(B) *The accidental Minerals* found occasionally in the Dublin and Wicklow Granites are :—

<i>Beryl</i> ,	.	.	.	Pale, greenish, opaque crystals. Loc. Dalkey, Killiney, Glenmalure, Glenmacanas.
<i>Spodumene</i> ,	.	.	.	Long, bent, greenish grey prisms. Loc. Killiney.
<i>Killinite*</i> (altered <i>Spodumene</i>).	.	.	.	Fibrolamellar, light green to brownish yellow, brittle ; sp. gr. 2·56. Loc. Killiney.
<i>Schorl</i> ,	.	.	.	Black. Loc. Clarinda Park, Kingstown ; Dalkey, Three Rock Mountain, Stillorgan, Roundwood, Glen- malure, Poulmounty.
<i>Garnet</i> ,	.	.	.	Small red and brilliant crystals. Loc. Dalkey, Killiney. Cinnamon colour. Loc. Glenmalure, Kilranelagh.
<i>Fluorspar</i> ,	.	.	.	Small cubes. Loc. Golden Bridge. Octohedra, lining cavities. Loc. Dalkey Island, Dalkey Quarry.
<i>Apatite</i> ,	.	.	.	Light green, translucent, hexagonal prisms, with lateral edges replaced. Loc. Three Rock Mountain, Killiney Hill.
<i>Agalmatolite</i> ,	.	.	.	Loc. Dundrum, Luganure.

2. THE MINERALS OF THE METAMORPHIC SLATES OF DUBLIN AND WICKLOW.†

In addition to the Micas and Hornblende forming constituent

* The so-called *Killinite* is an altered *spodumene*, from which the lithia has been washed out by weathering.

† The absence of Garnet, Idocrase, and other lime minerals from the metamorphic slates of Leinster is remarkable and very different from what is observed in Donegal and elsewhere.

elements of the Metamorphic Slates, the following minerals are occasionally found :—

<i>Andalusite</i> , . . .	Loc. Lugduff, Douce, Luganure, Glendalough, Glenmalure.
<i>Chiastolite</i> (variety of <i>Andalusite</i>),	Loc. Killiney, Aghavanagh, Baltinglass Hill.
<i>Staurotide</i> , . . .	Loc. Killiney, Glenmalure.
<i>Hornblende</i> , . . .	Radiated. Loc. Killiskey, Crystallized, dark green. Loc. Kilranelagh.
<i>Jasper-agate</i> , . . .	Loc. Lambay Island.
<i>Mocha Stone</i> , . . .	Loc. In pebbles found on the sea-beach, Co. Wicklow.
<i>Zircon</i> , . . .	Loc. Croghan Kinshela.
<i>Gold</i> , . . .	Loc. Croghan Kinshela.
<i>Magnetite</i> , . . .	Loc. Croghan Kinshela.
<i>Chlorite</i> , . . .	Loc. Glenmacanas ; Howth.
<i>Spinel</i> , . . .	Small rolled grains. Loc. Croghan Kinshela.
<i>Platinum</i> , . . .	Loc. Croghan Kinshela.
<i>Wood-tin</i> , . . .	Loc. Croghan Kinshela.

3. THE MINERALS OF THE CARBONIFEROUS LIMESTONE OF THE CO. DUBLIN.

The Minerals found, occasionally, in the Calp limestone and Lower limestone of the Co. Dublin are few in number. Among them may be mentioned :—

<i>Lylian Stone</i> , . . .	Calp limestone (<i>passim</i>).
<i>Iron Pyrites</i> , . . .	Well formed crystals, occurring in sheets, lining joints in the Calp limestone.
<i>Asphaltum</i> , . . .	Solid, opaque, resinous black lustre, conchoidal fracture. Loc. Castleknock.
<i>Anthraconite</i> , . . .	Loc. Castleknock.

4. MINERALS FOUND IN THE MINES OF THE COUNTY WICKLOW AND COUNTY DUBLIN.

<i>Iron Pyrites</i> , . . .	Loc. Sulphur mines, Vale of Avoca.
<i>Fluorspar</i> , . . .	Large yellow and pale violet blue cubes. Loc. Glendalough mine.
<i>Schieferspar</i> , . . .	Loc. Luganure mines.
<i>Barytes</i> , . . .	Loc. Killiney Hill ; Luganure mine ; Glenmalure mine ; Clontarf.
<i>Native Silver</i> , . . .	Loc. Ballycorus mine.
<i>Horn Silver</i> , . . .	Loc. Ballycorus mine.

<i>Brown Hæmatite,</i> .	Loc. Glenasplinkeen.
<i>Manganese Oxides,</i>	Loc. Glenasplinkeen ; Howth.
<i>Native Copper,</i> .	Loc. Cronebawn ; Ballymurtagh.
<i>Copper Pyrites,</i> .	Loc. Cronebawn ; Ballymurtagh ; Avoca.
<i>Tinstone,</i> . .	Loc. Croghan Kinshela, in small rolled fragments and detached worn crystals.
<i>Carbonate of Lead,</i>	Loc. Luganure mines.
<i>Sulphate of Lead,</i> .	Loc. Luganure ; Ballycorus.
<i>Phosphate of Lead,</i>	Loc. Glenmalure.
<i>Galena,</i> . .	Loc. Ballycorus ; Luganure ; Glendalough.
<i>Blende,</i> . .	Loc. Clontarf ; Glenmalure.

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